

## Descending Thoracic Aorta to Bilateral Femoral Artery Bypass in a Hostile Abdomen

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Descending thoracic aorta to femoral artery bypass has been used as a remedial operation after aortic or axillofemoral graft failure or graft infection and other intra-abdominal pathologies not amenable to standard aortofemoral revascularization. It can avoid abdomen approach and has been known as a durable procedure with excellent long-term patency. We reported descending thoracic aorta to femoral artery bypass grafting for primary revascularization in a 55-year-old male with hostile abdominal conditions.

Key words: 1. Aorta, surgery  
2. Bypass

### CASE REPORT

A 55-year-old male was referred to our department for total abdominal aorta obstruction with intermittent claudication. At first, he visited the emergency room with epigastric pain. He had a history of hemigastrectomy and gastrojejunostomy for acute gastric ulcer with perforation 4 years ago. He also had a history of diabetes mellitus and 30 pack-years smoking. Abdominal sonography showed the pancreas of diffuse enlarged parenchyme with normal common bile duct. Abdominal computed tomography (CT) showed the swelling of pancreas and small amount of fluid retention around pancreas with no demonstrable bile duct stone and total occlusion of infrarenal aorta to both common iliac arteries. After he completed antibiotics therapy for acute pancreatitis and cholangitis, he was transferred to our department for treatment of

total occlusion of abdominal aorta (Fig. 1).

CT angiography showed total occlusion of infrarenal aorta, both common iliac arteries and left external iliac artery with collateral arterial flow into both femoral arteries. CT angiography also showed focal short segmental stenosis in superior mesenteric artery origin area with abundant collateral flow. Preoperative ankle-brachial indices were 0.49 and 0.42 (right and left). Considering relatively young age of the patient, durable bypass procedure like aortobifemoral artery was needed. However, the patient has previous abdominal surgery for gastric ulcer perforation and recent inflammatory conditions, pancreatitis and cholangitis. After discussing various surgical alternatives, we decided to perform descending thoracic aorta to both femoral artery bypass surgery to avoid operation in a hostile abdomen.

With double-lumen endo-tracheal intubation to allow de-

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**Fig. 1.** Preoperative computed tomography angiography.

flation of the left lung, the patient was positioned with the right semi-lateral position. The pelvis was placed flat to allow access to both groins. Left posterolateral thoracotomy was performed through the eighth intercostal space, then, the distal descending thoracic aorta just above diaphragm and both femoral arteries were exposed simultaneously. The distal descending thoracic aorta was mobilized from the parietal pleura to allow placement of a partially occluding clamp and a stab wound was made for graft. Leaving the inguinal ligament intact, the oblique and transverse muscles of left side were split and the left retroperitoneal space was entered. Using blunt finger dissection, retroperitoneal tunneling was performed between the left hemithorax and the left supra-inguinal preperitoneal space and cross over tunnel between both groin incisions was created similarly. After partial clamping on thoracic descending aorta with systemic heparinization, a 10 mm polytetrafluoroethylene (PTFE) graft (Gore-Tex; Flagstaff, AZ, USA) with externally supported rings was anastomosed to the aorta proximally in an end-to-side fashion. And then distal anastomosis (left groin) was performed to left common femoral artery. After that, right common femoral artery and 10 mm graft were connected with 8 mm PTFE graft with rings. A chest tube (28Fr) was placed in the left pleural space and all incisions were closed.

Postoperative course was uneventful and postoperative ankle-brachial indices were improved from 0.49 and 0.42 to



**Fig. 2.** Postoperative computed tomography angiography.

0.95 and 0.94 (right and left). All bypass grafts were patent in postoperative CT angiography (Fig. 2). The patient was discharged without any complication and claudication 7 days after surgery. He is doing well without symptom at 30 months postoperatively.

## DISCUSSION

Bypass from the descending thoracic aorta (DTA) to the iliac or femoral arteries has been used mostly as an alternative procedure for aortic reconstruction in patients with unusually difficult conditions contraindicating the trans-abdominal approach. More than half of the reported bypasses from the DTA have been remedial aortic reconstructions in patients with one or more previous abdominal aortic graft failures because of thrombosis or infection, in many instances with additional failure of extra-anatomic subcutaneous bypass [1]. Despite use as a remedial operation and small number of patients, published results have been satisfactory, with low perioperative mortality, morbidity, and good long-term patency rates [1-3]. These have supported its continued use as an alternative procedure for aortic graft failure or infection and a more liberal use for primary revascularization for patients with severe atherosclerotic disease or complete occlusion of the infrarenal aorta, especially when a direct trans-abdominal aortic approach is not feasible [3].

Although DTA-to-femoral bypass grafting as the primary choice of treatment for infrarenal aortic occlusion is controversial, there are several reasonable advantages for using the DTA as an inflow source. The DTA is less prone to atherosclerotic disease than the infrarenal aorta [4]. And dissection of the aorta in the chest cavity is simple because few surrounding structures are present. Although the aortic exposure can be limited by the presence of pleural adhesions, the potential complications and morbidity associated with trauma of the small and large intestine, ureters, and iliac veins during the exposure of the aorta are completely avoided [5]. Moreover, the use of a partial occlusion clamp on the aorta during proximal anastomosis maintains spinal cord, mesenteric, and renal blood flow.

This procedure has better durability compared to the axillary artery, commonly chosen as sites of inflow source except abdominal aorta. In 1999, Passman et al. [3], in the largest series published so far (50 patients), assessed the role of this procedure as a first-line treatment modality in infrarenal aortic occlusion; the primary patency rate at 5 years was 81%, comparable to the 83% to 92% patency rates for standard aortofemoral bypass grafting in most series.

There are few contraindications for this operation, however, and it should not be carried on in the presence of aneurysmal dilatation or severe occlusive disease in the thoracic aorta. Prior left thoracotomy or preexisting left lung or pleural disease is relative contraindications [6].

Because the patient in this case was relatively young and expected to have a hostile abdomen, we decided to use DTA as inflow for primary revascularization to avoid entering abdomen and renal injury. Some authors have recommended supraceliac aorta bypass surgery within the retroperitoneal space for juxtarenal aortic occlusive disease [7]. We also decided to use DTA for avoiding retroperitoneal adhesion and graft infection, because the patient had completed antibiotics therapy for acute pancreatitis and cholangitis. He had no pleural adhesion and thoracic descending aortic pathology and the thoracic procedure was performed comfortably.

The major limitation to this technique is the morbidity rate

associated with thoracotomy in a relatively high-risk vascular surgery population. The minimally invasive videoendoscopy procedure has been shown to improve the postoperative course and comfort of patients in general and thoracic surgery. The same benefits could be expected from a videoendoscopy procedure on the descending aorta. Also, tunneling in conventional DTA-to-femoral artery bypass is usually a “blind” procedure. If tunneling is performed with videoendoscopy, it would provide visual control of retroperitoneal tunnelling, preventing any wrong directions which could cause iatrogenic trauma [8].

For the cardiothoracic surgeon with experience, the use of descending thoracic aorta could be a very good alternative for infrarenal aortic occlusion or extra-anatomic aortoiliac bypass.

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